

SOME MOTHS OF THE RESERVE MICHEL-HERVE JULIEN, CAP SIZUN, BRITTANY

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INTRODUCTION

The Cap Sizun nature reserve is a small area of cliff about 8 km from the Pointe du Van in Brittany. It was created in 1959 as an ornithological reserve for the protection of birds, particularly razorbills, guillemots and kittiwakes. However, the reserve is also interesting for its fauna and flora, with areas of maritime heathland similar to the heathland communities of Cornwall. Some of the moths already known on the reserve (e.g. *Euproctis chrysorrhoea* L.) are largely coastal in the northern colder parts of Europe (e.g. in Britain) and they are more abundant in warmer regions.

AIMS

To establish a list of the moths on the reserve with special reference to their rarity and distribution in northern Europe. To compare the moths of the reserve with the moths of the cliffs of Cornwall.

METHODS

I studied the moths of the reserve in Brittany between 2 and 5.vi.88. There are two main sections of the reserve (An Aoteriou and the public part both of which contain named areas) and both were sampled on three nights and occasionally during the day. In An Aoteriou one site in the lee of a large granite outcrop was trapped twice, whilst on the third night the trap was placed at a nearby site called Stang Kermadeu by a stream. In the main public part of the reserve, three sites (Porz Kanape, Porz N'Hallen and Kastel Ar Roc'h) were sampled at night as well as by day, whilst a fourth site (Begalochou) was sampled during the day only.

In Cornwall, a site comparable to the reserve in Brittany was chosen and sampled in comparable weather conditions. The trap was placed at Hodder Downs, Reskajeage, which is a north facing cliff with typical Cornish cliff plants such as *Calluna vulgaris* (L.), *Silene maritima* With., *Cochlearia officinalis* L. and *Armeria maritima* (Mill.). On 12.vi.88 the trap was placed in the lee of a granite outcrop that was covered with the lichen *Ramalina siliquosa*.

Most collecting was done at night using Heath traps. The traps were placed out of the wind as far as possible, but on one windy night one trap had to be weighed down with a large stone. Meteorological conditions are critical for catch size; the ideal conditions for moths are warm, still, cloudy nights when the atmospheric pressure is low. High winds, low temperatures and clear skies all mitigate against moths flying. The catch was collected in the morning, the immediate surrounds being searched for moths which might have settled on rocks or vegetation. Any moths that could not be named immediately were taken back to the house for identification. All others were released on site.

In conditions where wind is not a problem, a mercury vapour bulb over a white sheet may be used. This method of attraction is more powerful, and up to 40% more moths may be caught (Heath, 1970). However, some smaller species are perhaps less likely to be caught this way, and no comparisons of catches can be made unless a trap such as the Robinson trap is used. It had also been intended to try sugaring, which is a method by which a sweet alcoholic mixture is painted onto rocks and vegetation, but it was decided that the weather was unsuitable for this technique.

Some searching was done during the day for diurnal species and larvae, and some flying insects were caught by netting. No sweeping was done, as much of the habitat was unsuitable because of the closely cropped vegetation.

Identification of most moths represented little problem. With a few species, it was necessary to dissect the moths to examine the genitalia. This was done with the *Oligia* and *Eupithecia* species, and also with *Bactra lancealana*, *Schrankia costaestrigalis* (a very worn specimen), and *Scoparia pyralella* (f. *ingratella*). A few larvae were taken by me and bred through to adult form by a colleague, J. L. Gregory.

RESULTS IN BRITTANY

An Aoteriou

The total night-time catch (over three nights) was 152 moths representing 49 species. The first night (2.vi) was the most productive, 113 moths and 43 different species being caught. Weather conditions were good, the wind was slight and the night was warm (12°C). The following night, with the catch at the same station, only two more species were added to the list. Although the trap was placed on the lee side of a large rocky outcrop out of the strong westerly wind and the temperature was 11°C, just 19 moths and 11 species were found. On the third night the trap was placed at the edge of the valley at the eastern edge of the reserve (Stang Kermadeu), a different kind of habitat where the vegetation included *Rubus fruticosus* (L.) and *Hedera helix* L. Although the trap was sited out of the strong northerly wind, only 20 moths (12 species) were caught, adding four more species to the list. The commonest moth on this part of the reserve was *Ceramica pisi* (21 individuals), followed by *Spilosoma lubricipeda* (13), *Diaphora mendica* (10) and *Hadena confusa* (9). Also found here in profusion were the diurnal *Cydia internana*, which flies actively around bushes of *Ulex* species; the males are readily distinguished by their white hindwings. Larvae of *Cleorodes lichenaria* were numerous, well camouflaged on the lichens on which they were feeding. Some of the larvae had pupated and the pupal cases were constructed of silk covered with tiny strands of lichen and fastened to the lichen fronds hanging from the rock. I collected a pupal case on 3.vi, and a moth emerged on 14.vi. A small green larva with a black spot on its back was found on lichens by the trap on 3.vi and was taken back to Britain. By the 7.vi it pupated, and *Nudaria mundana* emerged on 16.vi. I also found several larvae of *Euproctis chrysorrhoea* feeding on *Prunus spinosa* L., and the larval case of *Psyche casta* which is constructed of longitudinally placed grass stems. The butterfly *Callophrys rubi* was flying at the southern end of the reserve.

The main part of the reserve

I found 41 species, including two unidentified species, one adult moth and one Geometrid larva. I brought the larva to Britain, where J. L. Gregory bred it through to the pupal stage. It will probably prove to be *Colostygia multistrigaria*. On the first night (2.vi) the trap was sited in a bed of *Oenanthe crocata* L. by the stream at the western edge of the reserve below the quarry; 63 moths of 30 species were caught. The most common moth was *Ochropleura plecta*. This site was not typical of the reserve, with six species not being found elsewhere. *Alcis repandata*, *Spilosoma luteum*, and *Diarsia mendica* were only found here and at Stang Kermadeu, which similarly did not have direct coastal exposure. The next night was very windy, and the trap was placed at Porz N'Hallen where the catch was only 10 moths (three species). On the final night, the trap was placed at Kastell Ar Roc'h, where the northerly wind was so strong that it was necessary to weight the trap down with a large stone. Only

three moths were caught here, all *Hadena perplexa perplexa*. This was the most common moth on this part of the reserve along with *Ochropleura plecta* (11 individuals of each species). The next most common moth was *Spilosoma lubricipeda* (nine individuals).

Also found here were several larvae, including the cases of one of the Psychidae (not identified to species). Several *Euproctis chrysorrhoea* larvae were seen on a

Table 1. Moth list Cap Sizun 2-5.vi.88.

Name	Status	Numbers			
<i>Hepialus hecta</i> L.	C	2	<i>Lomographa temerata</i>		
<i>Psyche casta</i> Pall.	C	1L	D.&S.	C	1
<i>Neofaculta ericetella</i> Gey.	C	1	<i>Sphinx ligustri</i> L.	L	1
<i>Hedya pruniana</i> Hübn.	C	2	<i>Laothoe populi</i> L.	C	1
<i>Bactra lancealana</i> Hübn.	C	*	<i>Eligmodonta ziczac</i> L.	C	2
<i>Cydia internana</i> Guen.	L	*	<i>Calliteara pudibunda</i> L.	C	4
<i>Scoparia ambigua</i> Treits.	C	2	<i>Euproctis chrysorrhoea</i> L.	C	*
<i>Scoparia pyralella</i>			<i>Nudaria mundana</i> L.	L	1L
<i>f. ingrata</i> Zell.	C	1	<i>Eilema complana</i> L.	C	1L
<i>Lasiocampa trifolii</i> D.&S.	L	1L	<i>Spilosoma lubricipeda</i> L.	VC	21
<i>Macrothylacia rubi</i> L.	C	2	<i>Spilosoma luteum</i> Hufn.	C	5
<i>Philudoria potatoria</i> L.	C	2	<i>Diaphora mendica</i> Clerk	C	11
<i>Idaea subsericeata</i> Haw.	SL	1	<i>Axylia putris</i> L.	VC	8
<i>Xanthorhoe spadicearia</i>			<i>Ochropleura plecta</i> L.	VC	14
D.&S.	N	2	<i>Noctua pronuba</i> L.	VC	4
<i>Xanthorhoe ferrugata</i>			<i>Lycophotia porphyrea</i>		
Clerk	C	3	D.&S.	L	2
<i>Xanthorhoe fluctuata</i> L.	C	1	<i>Diarsia mendica</i> F.	C	2
<i>Epirrhoe alternata</i> Mull.	C	1	<i>Diarsia rubi</i> View.	C	3
<i>Chloroclysta truncata</i>			<i>Xestia c-nigrum</i> L.	VC	5
Hufn.	C	1	<i>Discestra trifolii</i> Hufn.	C	1
<i>Colostygia pectinataria</i>			<i>Hada nana</i> Hufn.	C	6
Knoch	N	3	<i>Ceramica pisi</i> L.	C	27
<i>Euphyia unangulata</i> Haw.	L	1	<i>Hadena perplexa perplexa</i>		
<i>Eupithecia pulchellata</i>			D.&S.	C	14
Steph.	W	1	<i>Hadena confusa</i> Hufn.	C	10
<i>Eupithecia vulgata</i> Haw.	C	1	<i>Mythimna pallens</i> L.	C	2
<i>Eupithecia subfuscata</i>			<i>Rusina ferruginea</i> Esp.	C	2
Haw.	C	1	<i>Euplexia lucipara</i> L.	C	5
<i>Eupithecia nanata</i> Hübn.	H	5	<i>Phlogophora meticulosa</i> L.	C	3
<i>Lomaspilis marginata</i> L.	C	1	<i>Oligia strigilis</i> L.	C	1
<i>Petrophora chlorosata</i>			<i>Oligia versicolor</i> Borkh.	L	2
Scop.	C	11	<i>Hoplodrina ambigua</i>		
<i>Opisthographa luteolata</i> L.	C	3	D.&S.	C	3
<i>Plagodis dolabraria</i> L.	C	1	<i>Caradrina morpheus</i> Hufn.	C	1
<i>Biston betularia</i> L.	C	1	<i>Diachrysa chrysis</i> L.	C	1
<i>Peribatodes rhomboidaria</i>			<i>Autographa jota</i> L.	L	1
D.&S.	C	5	<i>Rivula sericealis</i> Scop.	C	1
<i>Alcis repandata</i> L.	C	4	<i>Schrankia costae</i> strigalis		
<i>Cleorodes lichenaria</i> Hufn.	L	*	Steph.	L	1
			Total	228	

Key: * = several (larvae or adults); 1L = one larva. Distribution in Europe: VC = very common; C = common; L = local; N = northern; W = western; S = southern; H = heathland. Note: this list excludes a possible *Colostygia multistrigaria* larva, one unknown moth and one unidentified *Luffia* species.

variety of plants; it appeared that they had eaten all the *Prunus spinosa* L. (their natural foodplant) available in the vicinity. One larva of *Lasiocampa trifolii* was recorded at Begalochou. A larva of *Eilema complana* was taken at Kastell Ar Roc'h, bred through by J. L. Gregory and emerged on 8.viii. Also present were several larvae of *Cleorodes lichenaria*, some having already pupated.

Some moths were found during the day, including *Epirrhoe alternata*, which was disturbed from the vegetation, and the common *Neofaculta ericetella*, which feeds on *Calluna vulgaris* (L.). In the wet flush near the public section of the reserve, I found several of the very common *Bactra lancealana*, which feed on various species of *Juncus* and *Scirpus*. Also flying were the butterflies *Pyrgus malvae* and *Lasiommata megera*.

Overall

Sixty-eight species were found, excluding a small dark unidentified moth (found on 5.vi on the main reserve) but including the two unidentified larvae which have been placed into family. The two parts of the reserve had similar moth fauna with considerable duplication of species, so that although the species totals for each part of the reserve were 54 and 40, the total number of species caught was only 68. Both sections of the reserve were surveyed in similar fashion, with similar sampling time and under similar weather conditions. Comparing the two communities using the Sorenson coefficient of similarity $C_s = 2j/(a+b)$, where j = the number of species in common and a and b are the number of species at the two sites. $C_s = 0.568$ (where a result of 1 would mean total similarity and 0 would mean total dissimilarity).

Over 228 moths were caught in all (Table 1), excluding those larvae and day-flying species which were too numerous to count, e.g. *Cydia internana*. Apart from these, the most common moth was *Ceramica pisi* (27 individuals), which is common throughout Europe in open areas and although polyphagous probably feeds on *Pteridium aquilinum* (L.) on the reserve. The second most common moth was *Spilosoma lubricipeda* (21 individuals), which is widespread in Europe. *Spilosoma luteum* was represented by only five individuals; although as widespread as the previous species, I have found it to be less common in coastal areas. Only seven species were found more than 10 times, and 22 out of the 68 species were represented by one individual only, which indicates high species diversity.

Table 2. Comparison catch Hodder Downs, Reskajeage, Cornwall 12.vi.88.

i) Daytime

Macrothylacia rubi L. Fox Moth (several males flying)

ii) Heath trap 12°C

Name	Numbers	Name	Numbers
Hepialus lupulinus L.	3	Xanthorhoe fluctuata L.	2
Aspilapteryx tringipennella Zell.	1	Eupithecia pulchellata Steph.	3
Ypsolopha dentella F.	1	Spilosoma luteum Hufn.	1
Elachista argentella Clerk	1	Agrotis exclamationis L.	1
Aesthes cnicana Westw.	1	Ochropleura plecta L.	2
Hedya pruniana Hübn.	1	Lycophotia porphyrea D.&S.	3
Epiblema scutulana D.&S.	1	Diarsia rubi View.	1
Scoparia pyraelella D.&S.	1	Hada nana Hufn.	1
Idaea subsericeata Haw.	1	Hadena confusa Hufn.	18
Xanthorhoe montanata D.&S.	5	Hadena bicruris Hufn.	4
		Total	52

COMPARISON WITH MOTHS IN CORNWALL

The catch here (12.vi) was a week later than the catches in Brittany, but as many moths fly slightly later in Cornwall so the time difference should not have been critical. A warm still night was chosen (temperature 12°C), comparable with the night of 2.vi. The total catch was 52 moths, representing 20 species (Table 2). The most common moth was *Hadena confusa* (18 individuals); 12 species were represented by one moth only. Twelve species were common to both Brittany and Cornwall, including *Macrothylacia rubi*, which was seen flying during the day but which did not come to light. A comparison with the single catch at An Aoteriou on 2.vi is instructive. Here, the catch was 113 moths, representing 43 species, but only seven moths were common to both catches. The Sorenson coefficient of similarity between the two sites was 0.222. The catch at Porz Kanape on 2.vi yielded 63 moths representing 30 species, with five species in common. The Sorenson coefficient of similarity for this site and the site in Cornwall was 0.2, whereas between the two catches in Brittany the similarity coefficient was 0.548 (0.568 for the total catch over 3 days). The two sites in Brittany have greater similarity than has either site with the site in Cornwall.

Simpson's index of diversity D was used to compare the species richness of the three catches. This index gives little weight to rare species and greater weight to common species, and measures the probability of picking two organisms at random that are different species. The larger the value of index D , the greater its equitability. The species diversity according to Simpson's index for An Aoteriou (2.vi) was 21.106, for Porz Kanape (2.vi) 13.186, whereas for Hodder Downs (12.vi) species diversity was much lower at 6.563.

DISCUSSION

The moths of Cap Sizun

The most common family here was the Noctuidae. The Noctuidae is the largest moth family worldwide, and many noctuids are highly adapted to their various habitats. Being robust, they are capable of flying in adverse weather conditions, and on the very windy night of 3.vi 14 out of 19 species caught at An Aoteriou were Noctuids, and in the trap at Porz N' Hallen only Noctuids were caught. Of the 68 species caught in total, 22 were Geometridae and five were Arctiidae. Since no sugaring was attempted, at night only light-sensitive species were caught, and the smaller moths were mainly taken in daytime. Most of the specimens caught are generally common over much of Europe (Table 1). Distributions for many species tend to be better known for Britain since more recording work has been done here in an area which is much smaller than mainland Europe. There is a correlation between the foodplants of moths and their distribution, although migrant moths may be found at great distances from their foodplants. However, many moths are much rarer than the distribution of their foodplants would indicate. Most of the moths at Cap Sizun feed on common plants. Of the 68 species, 35 are polyphagous, and most of these are widespread, although *Idaea subsericeata* is locally common. Four species (*Cleorodes lichenaria*, *Nudaria mundana*, *Eilema complana*, and *Luffia* sp.) feed on lichens, generally those species growing on trees, but *Nudaria mundana* feeds on lichens growing on rocks. *Psyche casta*, which is common everywhere, feeds on lichens and also grasses. Many species have either a southern or northern distribution in Europe (Meyrick, 1927; Novak, 1980; Carter, 1982), but this zonation is too broad to apply to Brittany. *Idaea subsericeata* is more common further south, but as it occurs in southern Britain its presence here was not unexpected. Species such as *Lasiocampa trifolii*, which are scarce in Britain and generally confined to the coasts, are

widespread over Europe, especially in the warmer south, even high into the mountains. Some species may be more common in the west of Europe, and this appears to be the case with *Eupithecia pulchellata* (Forster & Wohlfahrt, 1981), which is represented in eastern Europe by the subspecies *digitalaria*. Many species are on the western edge of their range in Brittany, and we might expect unusual forms to occur, as happens with the butterfly *Maniola jurtina* (Dowdeswell, 1981), but no extreme forms were found. *Arctia villica* has been found here previously, which may be ssp. *britannica* which is found in northern France. *Hoplodrina ambigua* is widespread in Europe in treeless areas, and has been expanding its range northwards into Britain, the Netherlands, Denmark and Sweden (Heath, 1983) from about 1940. However, it may have been established on the warm coasts of Cornwall well before this date.

Comments on individual moths in Brittany

One of the most interesting species which was pointed out to me was *Cleorodes lichenaria*, the larvae of which were found feeding on lichens of the genus *Ramalina*. P. W. James [BM(NH)] confirmed the lichen to be *Ramalina siliquosa*, producing a salazinic acid stain when tested chemically. *Ramalina cuspidata* is similar, but grows lower down the shore than *R. siliquosa*, and it may be that *C. lichenaria* will feed on this lichen as well. In Britain, the larvae are only known to feed on lichens on trees and fence posts (usually *Usnea* species), and even on Mull they probably feed on the lichen-covered stunted trees that grow there (B. Skinner pers. comm.) The larvae are so well camouflaged that they are very difficult to find. Apparently, the adults have been found at Kynance Cove, on the Lizard in Cornwall (P. Siddons pers. comm.) where there are no trees, and P. W. James reports that he found similar pupal cases on *Ramalina siliquosa* on the Lizard so it is possible that the larvae may also feed on *Ramalina* species in Cornwall. I brought two pupae back to Britain, and they emerged within 2 weeks. It is interesting to note that these specimens were much lighter than most British examples I have seen which are usually heavily dusted with dark green and well camouflaged on dark tree trunks. One of the Breton moths was lightly dusted with green scales, the other was a light brown colour with little green coloration and both these forms would be well camouflaged on the granite rocks of the reserve.

One common (nine specimens) moth was *Hadena perplexa*. Culot (1909–1913) gives two varieties, *capsophila*—now given sub-specific status—(which is a very dark form with the stigmata outlined with white) and *ochracea* (which is a light form). The subspecies *perplexa* occurs throughout Britain and Europe, whilst the darker *capsophila* is mainly coastal and occurs in Ireland, the Isle of Man, southern France and Corsica. At Cap Sizun, lightish specimens like *ochracea* were found which were *perplexa perplexa*, and these would be double-brooded here as they are in southern Britain.

The moths of Cornwall compared with those of Cap Sizun

Being some 100 miles further south than Cornwall, I would expect the climate in Brittany to be warmer and the moths to be flying earlier. In Brittany I found *Rivula sericealis* on 2.vi, which is some 3 weeks earlier than I have found it in Cornwall. Also early were: *Philudoria potatoria*, *Euphyia unangulata* and *Schranksia costaestrigalis*. Many species are double-brooded in Cornwall and Brittany, but single-brooded further north; I could not detect any differences between the moths of either place in this respect. The lack of *Ulex* spp., *Prunus spinosa* L., *Juncus* spp. *Pteridium aquilinum* (L.) and *Galium* spp. at the Cornish site limited the number of moth

species here. *Hepialus lupulinus* was present at Reskajeage rather than *Hepialus hecta*, which feeds on *Pteridium aquilinum* (L.) and is more common in wooded areas where the foodplant abounds.

Hadena confusa was found in some numbers (10 in Brittany, 18 in one night in Cornwall). This species is widespread throughout Europe (Reichholf-Riehm, 1984) except the extreme north, and varies greatly at the extremities of its range. Some Cornish specimens have ochreous coloration instead of white on the forewings (var. *ochrea* Culot Vol. 1:117).

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